THE RUMFORD KITCHEN LEAFLETS.

No. 9.

COMPARATIVE NUTRITION.

Revised for the Rumford Kitchen, by EDWARD ATKINSON.

WHILE my recent book upon "The Science of Nutrition" [1] was going through the press, a beginning was made in treating the subject of comparative nutrition.

When the twelve dietaries which have been given in this treatise had been prepared, it seemed probable that some use might be made of them in determining the relative cost of nutrition at the American standard in different States and countries. I could not, of course, expect to make anything but a crude beginning in this matter, because the habit of nutrition, if one may use this expression, varies greatly according to soil, climate, conditions, and wages.

In countries where meat is scarce, the chief source of nitrogen is found in a large relative consumption of cheese or of beans or other legumes. How far the price of a suitable day's ration may be equalized by the purchase of cheese or legumes in place of meat remains to be dealt with. For the moment a few comparisons may be interesting.

It will be observed that in the twelve dietaries given in the book the constants, consisting of grain, vegetables, and a modi-

[1] "The Science of Nutrition." Boston: Damrell & Upham, School and Washington Streets.

cum of butter or fat, are uniform; they are computed in sufficient quantities to support life, and are named

THE LIFE RATION.

The variables, consisting mainly of meat, are given of different quantities, at different prices, and are named

THE WORK RATION.

All prices are given at retail for small quantities, except flour, which is assumed to be purchased by the sack or barrel.

Rations corresponding to Dietaries Nos. 1 to 4, those costing 12 to 13 cts. per day each, in Boston, Mass., have been computed in various places, with the following results:

Cost of 57 lbs. grain, vegetables, and fat, and 25 lbs. of cheap cuts of meat, 82 lbs. in all; sufficient for rations for 30 days, at 3,467 Calories per day, the standard of a German soldier on a war footing being 3,093 Calories.

DATE. 1891.		LIFE RATION. 30 days.	WORK RATION. 30 days.	TOTAL. 30 days.
April.	Boston, Mass., U.S.A. (short crop of vegetables, 1890)	$2 31	$1 78	$4 09
November.	Boston, Mass., U.S.A. (vegetables abundant)	2 08	1 77	3 85
December.	Bismarck, N. Dakota, U.S.A.	1 43	2 42	3 85
September.	Paris, France	2 00	2 81	4 81
September.	London, England (in workmen's section)	2 16	2 52	4 68
November.	London, England (in West End shops),	2 42	3 60	6 02
October.	Madison, Wis., U.S.A.	1 70	1 77	3 47
September.	Beyreuth and Nuremburg, Germany,	2 52	3 76	6 29
October.	Topeka, Kansas, U.S.A.	1 54	1 53	3 07
December.	New Orleans, La., U.S.A.	2 40	1 92	4 32
October.	Lincoln, Neb., U.S.A.	1 38	1 78	3 16
October. 1892.	Ann Arbor, Mich., U.S.A.	1 87	1 86	3 73
February.	Brussels, Belgium	2 53	3 93	6 46
January.	Dresden, Germany	3 14	3 30	6 44
March.	Munich, Bavaria	3 30	3 63	6 93

	Life Ration. Cents per day.	Work Ration. Cents per day.	Total. Cents per day.
Boston, Mass.	7 70	5 93	13 63
Boston, Mass.	6 93	5 90	12 83
Bismarck, N. Dakota	4 77	8 07	12 84
Paris, France	6 66	9 37	16 03
London, England	7 20	8 40	15 60
London, England	8 06	12 00	20 06
Madison, Wis.	5 66	5 90	11 56
Beyreuth and Nuremburg, Germany,	8 40	12 53	20 93
Topeka, Kansas	5 13	5 10	10 23
New Orleans, La.	8 00	6 40	14 40
Lincoln, Neb.	4 60	5 93	10 53
Ann Arbor, Mich.	6 23	6 20	12 43
Brussels, Belgium	8 43	13 10	21 53
Dresden, Germany	10 05	11 00	21 05
Munich, Bavaria	11 00	12 10	23 10

The two returns from Dresden and Munich show the effect of the short crop of grain in 1891 upon prices.

I can of course claim only approximate accuracy for these comparisons. The personal equation will have a varying influence in obtaining prices. The habits of the people must be taken into view. In Boston, for instance, the tougher and coarser parts of beeves are sold for food; in Bismarck, North Dakota, they are probably put into the fat-rendering vats, not even being prepared for sale.

I have also been disappointed in the small number of returns received in reply to my circular, but yet hope to extend this inquiry, as there are now several associations in this country and in Europe which have taken up this matter in different ways.

Suffice it that even this beginning is very suggestive. It proves that where the nitrogenous element in food is abundant and cheap, labor is effective and wages are high. Where the nitrogenous element is scarce and dear, labor is not effective and wages are low.

Which is the antecedent and which is the consequent?

It will be observed that there is a much greater uniformity in

the price of the life ration than of the work ration. May not this indicate a deficiency of nitrogen as the *cause* of low rates of wages?

Again, if one may venture upon a somewhat visionary hypothesis, another comparison may be made and another question may be asked.

Where the burden of armies and navies is heavy, nitrogenous food is scarce among the people, — the army must be sustained even if the poor workmen starve. Witness Russia at the present time. Why must armies be sustained?

The army and the naval forces of the United States number only about 30,000 men, and are all that we require. At the ratio to population of European armies and navies, making comparison only with the force in camp or barracks and paying no regard to reserves, our army and naval forces would number from 600,000 to 800,000 men; and since it takes the product of at least one man to support one worse than idle soldier, such a burden would be equivalent to setting apart 10 per cent. or more of all the men of arms-bearing age from the productive and constructive work in which they are now occupied, to waste the most valuable and effective portion of their lives in the destructive work of preparation for war.

The mere money cost of this system of militarism, which is eating away the vital force of most of the European states, is about $1,000,000,000 a year. I am aware that army drill and discipline is justified as a mode of education. What does it cost? In Germany women do the scavenger work, — sweep the streets, mix the mortar for the builders, and perform the hardest work of the field, — while the men, at the most productive period of efficiency, are obtaining the education thus claimed to be justified. France is a little better off, but many parts of Italy are worse.

It will be observed that the science of nutrition is not confined to the domestic kitchen or to the recipe book.

As the supply of food comes to half the cost of life or more, in many parts of this prosperous country, so the barbaric folly may

be conceived of taxing the masses for the support of the classes by whom the military system is sustained and the military caste is supported in Europe.

The foregoing statements of the relative cost of nutrition must indicate that the proportionate cost of food to other elements in the cost of living is less in the Western States and cities than in the East or in Europe. In fact, the relation of food supply to the rate of earnings is even a more important factor than now appears. One can even predicate a rule on what is now known. It may be put in this form:

To him that hath food in abundance shall be given the power to gain more; from him that hath not shall be taken even that which he hath.

These considerations bring into view the importance of the problem of securing a supply of nitrogen at less cost. Our agricultural chemists and physiologists tell us that nitrogen is the most important, and at the same time the least abundant and most costly element in the nutrition of the plant, the beast, and the man. The atmosphere is four-fifths nitrogen and we can't yet catch it; the iron-smelting furnaces of this country are giving off ammonia enough to supply nitrogen to our fields, in large measure, and we waste it. We have begun to save the phosphatic slag of the furnaces for use as a fertilizer, and thus to convert iron ore into corn and wheat, — the next man will save the ammonia. In the meantime, the myriads of bacteria and microbes are being summoned to our aid, who, living in their little dwelling-places attached to the roots of clover, cow pea vines, and other renovating plants, draw nitrogen from the air to supply the plant which, when turned under, renovates the soil.

The present need in this country is not so much of instruction how to earn as how to spend an income, especially a small one.

If the energy which corresponds to the present waste of food material could be spent for more adequate shelter, the evils of the slums would be abated and the bad tenements in the slums

would be renovated. One may be warranted in estimating the present waste of food and fuel at five cents a day for each person, which is approximately twenty per cent. of the expenditure. To this we may add two cents a day, or less than half what is annually spent for liquors and tobacco — say seven cents a day in all. There are about 65,000,000 of us now, divided into 13,000,000 average families of five each.

At seven cents a day the measure of our waste of energy in converting good food into bad feeding, and upon liquor and tobacco at less than half their cost, amounts in each year to $1,660,750,000. If this waste of misdirected energy were converted into better methods of providing shelter, it would enable each family of five persons to spend $127\frac{75}{100}$ a year more for their dwelling-places than they do now.

Suppose the waste only four cents a day, — two cents on food and two on liquor and tobacco, — even that comes to nearly $1,000,000,000 worth of misdirected energy; and the waste is greatest among those who can spare it least.

I have said that the education most needed now is how to spend, more than how to earn. I find as much evidence of this in the present expenditures upon hospitals, college buildings, and school-houses as I do in the conversion of good food into bad feeding. In the ordinary practice of combustible architecture, of which this class of buildings are apt to be typical examples, I find hospitals in which the inmates are exposed to cremation before they are dead, covered in with crazy roofs which do not keep out the weather; college buildings which give the minimum of space and comfort at the maximum of cost, in which poor students can only be admitted by accepting charity; and finally school-houses in which about two in three are bad types of separate invention on different plans, each more or less unsuitable to its purpose, and costing from fifty to five hundred per cent. more than the sum for which a true typical school-house can be constructed if the motive of the work be light, air, and ventilation rather than outside appearances.

A typical school-house can be planned and specified in interchangeable parts, so that orders could be given for four, six, eight, and ten room buildings of good exterior design and exactly adapted to their purpose within, with the same absolute assurance of minimum cost that has been secured in the construction of the textile factory, the paper mill, and the machine shop of New England.

In the light basement of this school-house nearly or wholly above ground (a school-house ought never to have a dark cellar under it) provision may be made for the service of the building, for manual instruction, and for a cooking laboratory, in which instruction may be given in the simple principles of the Science of Nutrition and in the art of applying heat under due control and regulation to the conversion of food material into nutritious food. This can be done without encumbering the premises with costly stoves or ranges, but by making very simple provision for cooking the food, whatever it may be, in such a manner as to enable the boy or girl to carry back to the household such an example of right method as to make the common practice distasteful. If the true kind of cooking apparatus were set up, any kind of food could be dealt with, and in this way right methods might soon be brought into common practice.

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